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Commercial Real Estate Data Laboratory - CREDL

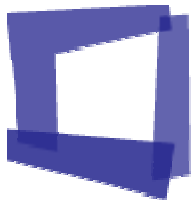
*A Quarterly Transactions-Based Index of
Institutional Real Estate Investment Performance
and Movements in Supply and Demand*

by

Jeff Fisher, David Geltner, & Henry Pollakowski

Prepared for:

ARES Annual Meeting, April 2005

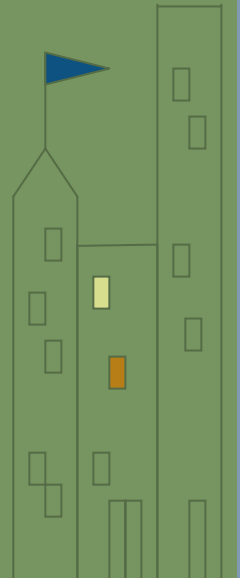


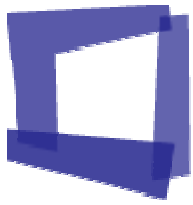
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About CREDL:

CREDL is an initiative of the MIT Center for Real Estate. The objective is to provide a “space” (virtual and real) for the development, refinement, and dissemination of quantitative measures of commercial property performance. This includes any dimension of performance: investment, operational, economic, engineering, environmental... CREDL is meant to provide a place to gather data, develop methodologies and tools, and provide a forum for analysis and perspective.





Transactions Based Index *Preliminary Development*

“In summary, we argue that the NCREIF Index is ready to evolve into two more specialized successor families of index products: one tailored for fundamental asset class research support, and the other tailored for investment performance evaluation benchmarking and performance attribution.”

-- From: D.Geltner & D.Ling, Benchmarks & Index Needs in the U.S. Private Real Estate Investment Industry: Trying to Close the Gap (A RERI Study for the Pension Real Estate Association), October 17, 2000.

Transactions Based Index

Preliminary Development

Transactions-based Index of Institutional Commercial Property Investment Performance:

- Quarterly, Total Return Index, Property-type level
- Based on NCREIF Database Transactions
- Advanced econometrics to:
 - Control for property differences
 - Control for transaction sample selection bias
 - Filter out estimation error “noise”
- Allows “*mass appraisal*” of NCREIF properties: Transactions-based valuation updates, each property, each quarter.
- Allows separate tracking of *Demand Side* (“*constant liquidity*”) & *Supply Side* movements in the market.

Transactions Based Index

Preliminary Development

Underlying Model is a classic hedonic price model:

$$P_{it} = \sum_j a_j X_{ijt} + \sum_t \beta_t Z_t + \varepsilon_{it}$$

where :

P_{it} = Log of Transaction Price (Property i , Period t)

X_{ijt} = Vector of j hedonic variables

Z_t = Time dummies (= 1 in Period t , 0 otherwise)

Transactions Based Index

Preliminary Development

We substitute the property's most recent *Appraised Value* for the vector of hedonic variables:

$$P_{it} = aA_{it} + \sum_t \beta_t Z_t + \varepsilon_{it}$$

where :

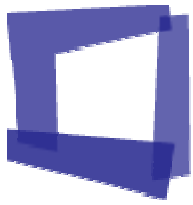
P_{it} = Log of Transaction Price (Property i , Period t)

A_{it} = Appraised Value of Property i , Period t

Z_t = Time dummies (= 1 in Period t , 0 otherwise)

[See Clapp & Giacotto, *JASA* 87: 300-306 (1992)]

Actually, we use the appraisal (NCREIF value report) 2 quarters prior to sale date, to avoid appraisal “contamination” by knowledge of sale price.



Transactions Based Index

Preliminary Development

Estimated β_t coefficient captures systematic difference between transaction prices and appraised values in Period t :

$$\hat{P}_{it} = \hat{a}A_{it} + \sum_t \hat{\beta}_t Z_t$$



Transactions Based Index

Preliminary Development

We can also estimate a *Constant Liquidity* version of the transactions-based index:

- Price movements to keep expected time on the market constant across the liquidity cycle

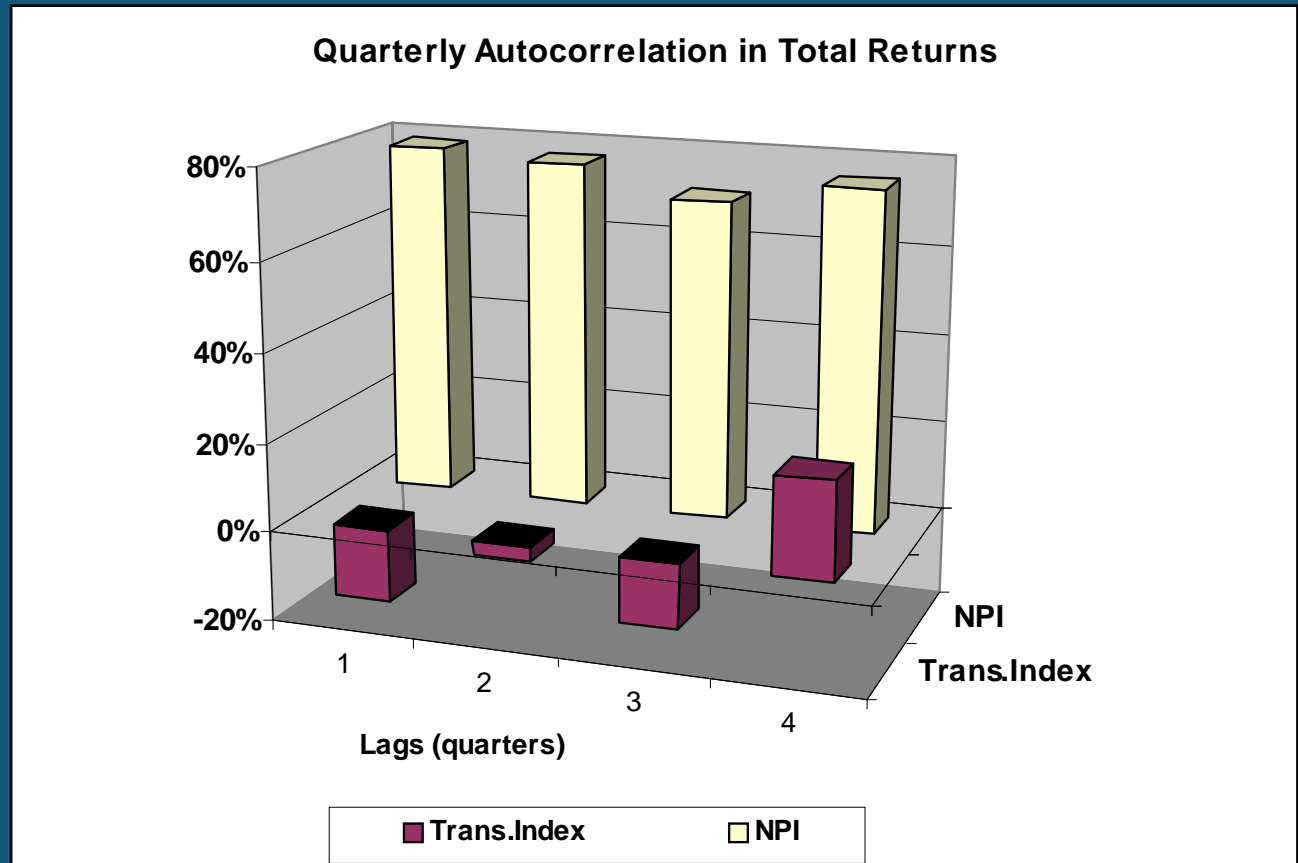
(See Fisher et al, Real Estate Econ. 31(2) 2003.)

- Based on model's ability to separately identify *demand side* and *supply side* movements in the market. (Demand side movements are “*Constant Liquidity Index*”.)
- Demand & Supply indices depict something like a “*Bid-Ask Spread*” in institutional commercial property market.

Transactions Based Index

Preliminary Development

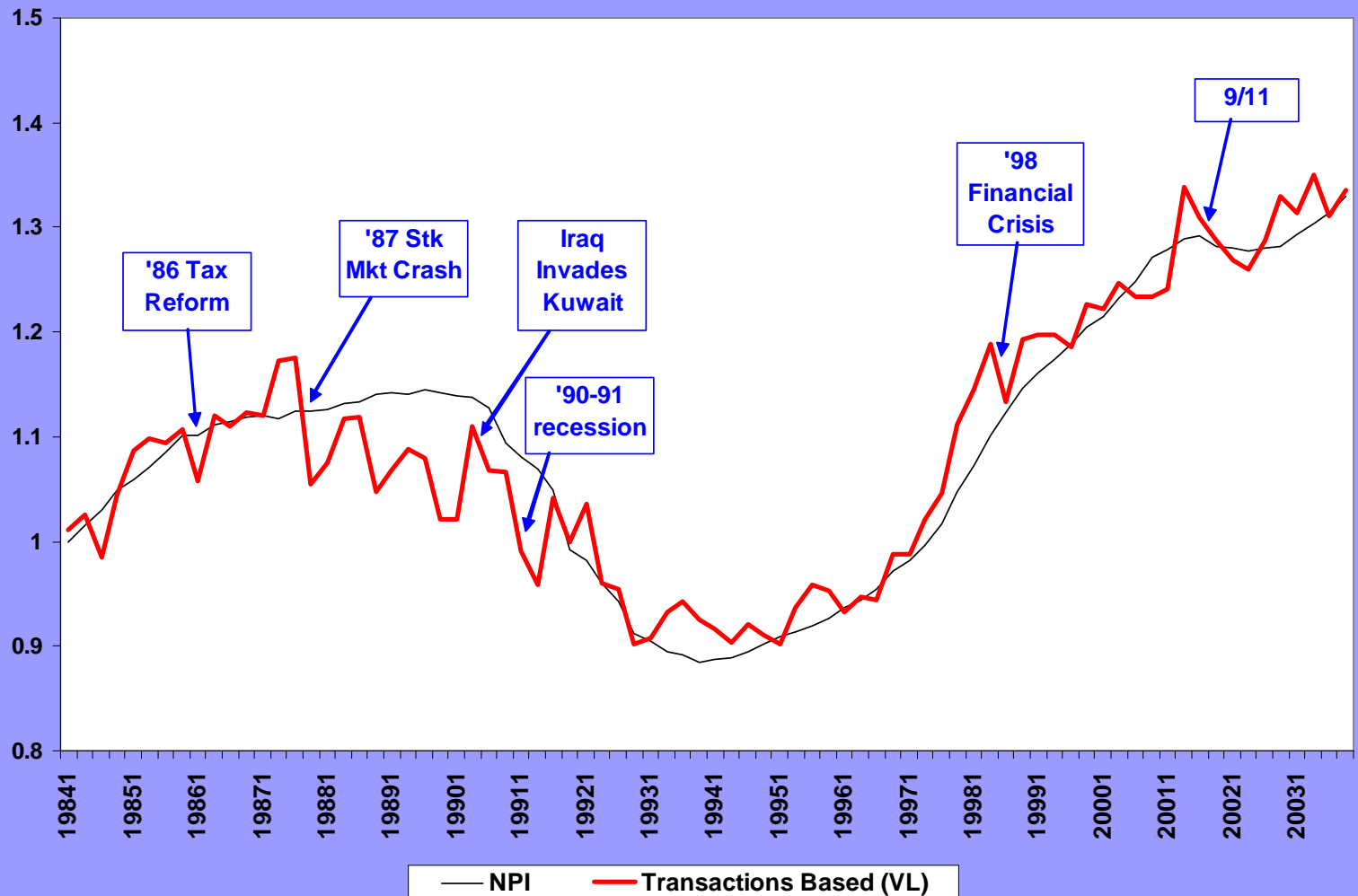
Transactions based index eliminates the inertia in the appraisal based index at the quarterly frequency



Transactions Based Index

Preliminary Development

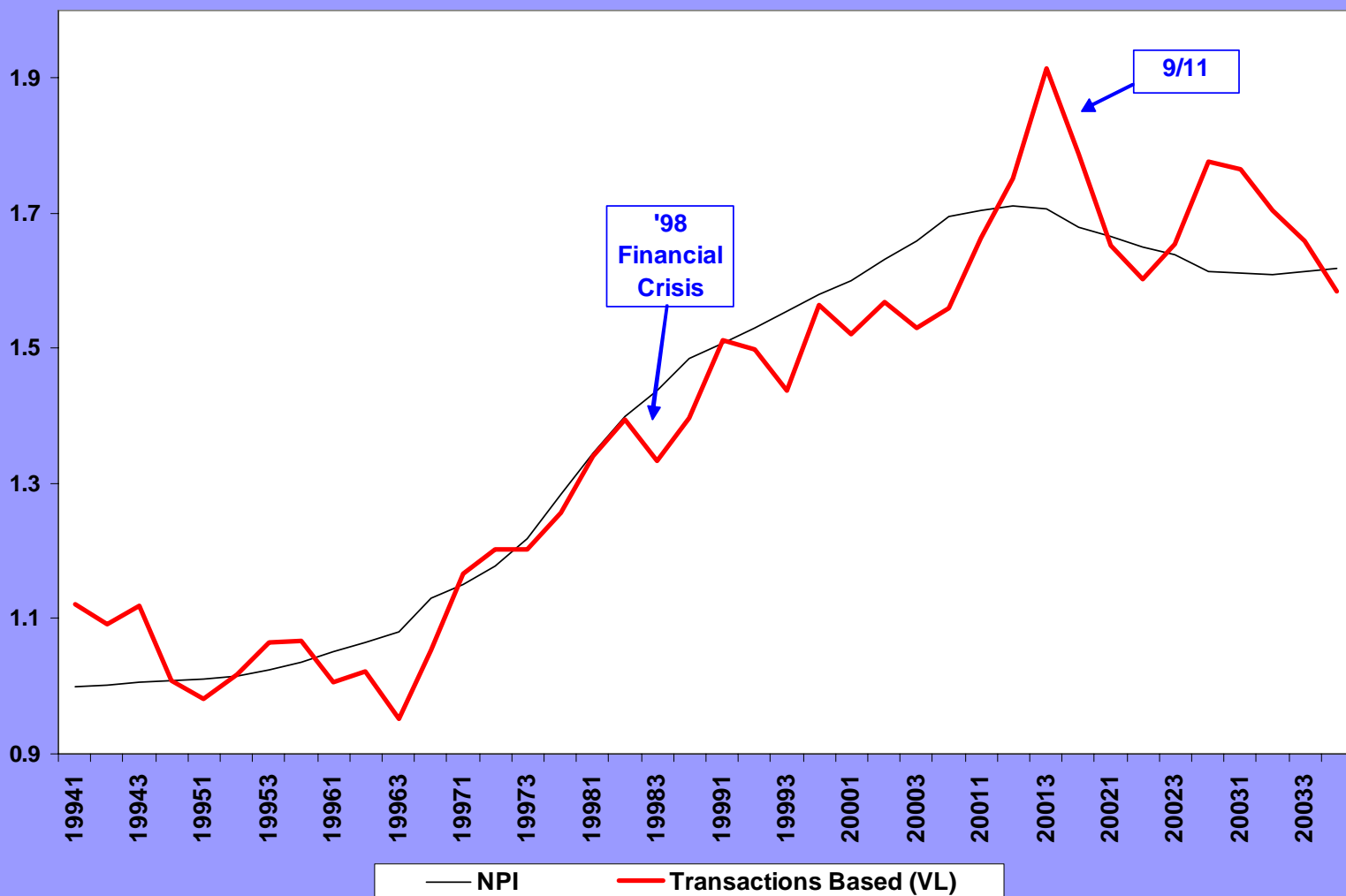
Quarterly Appreciation Levels, Transactions Based vs NPI



Transactions Based Index

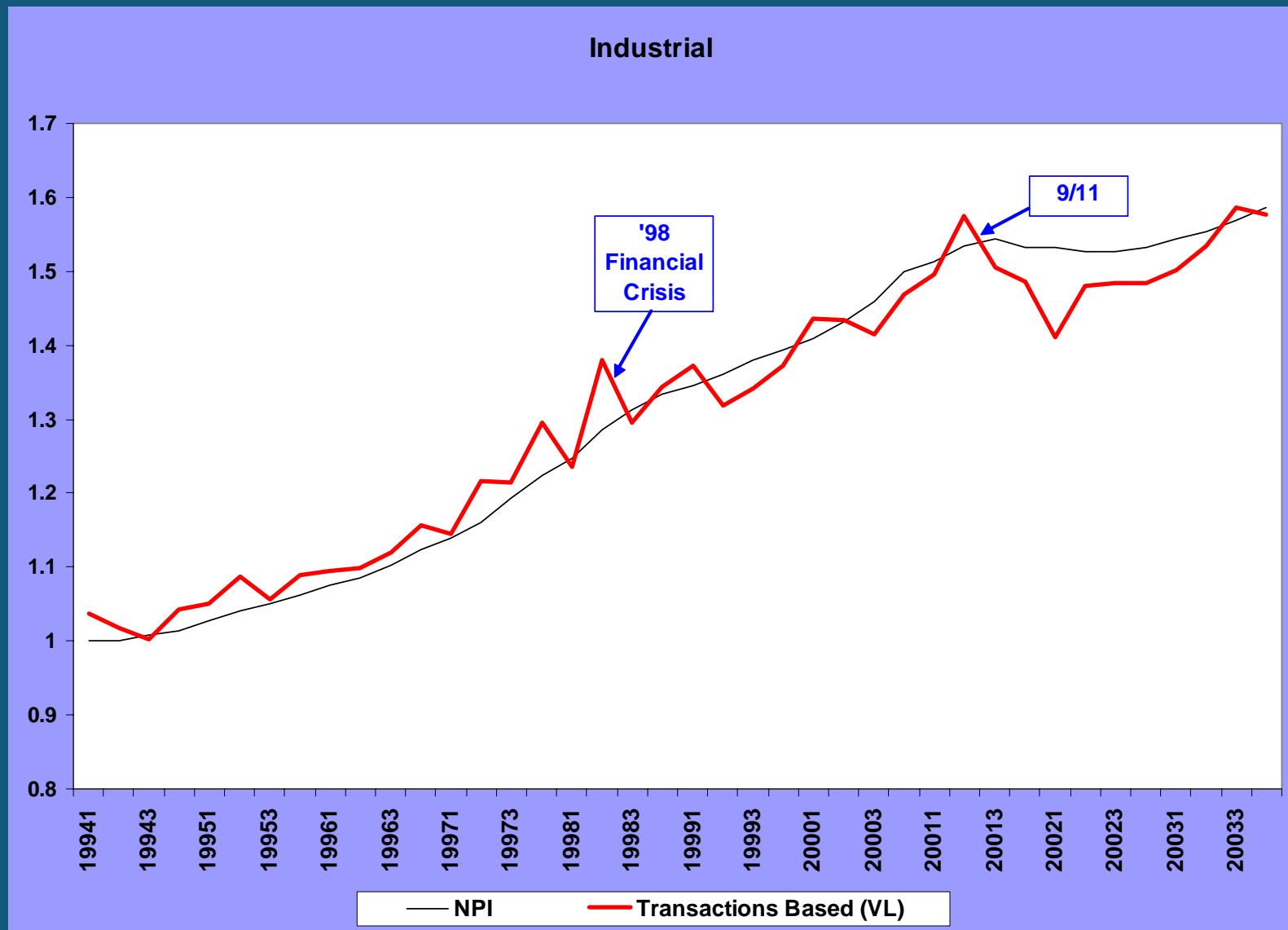
Preliminary Development

Office



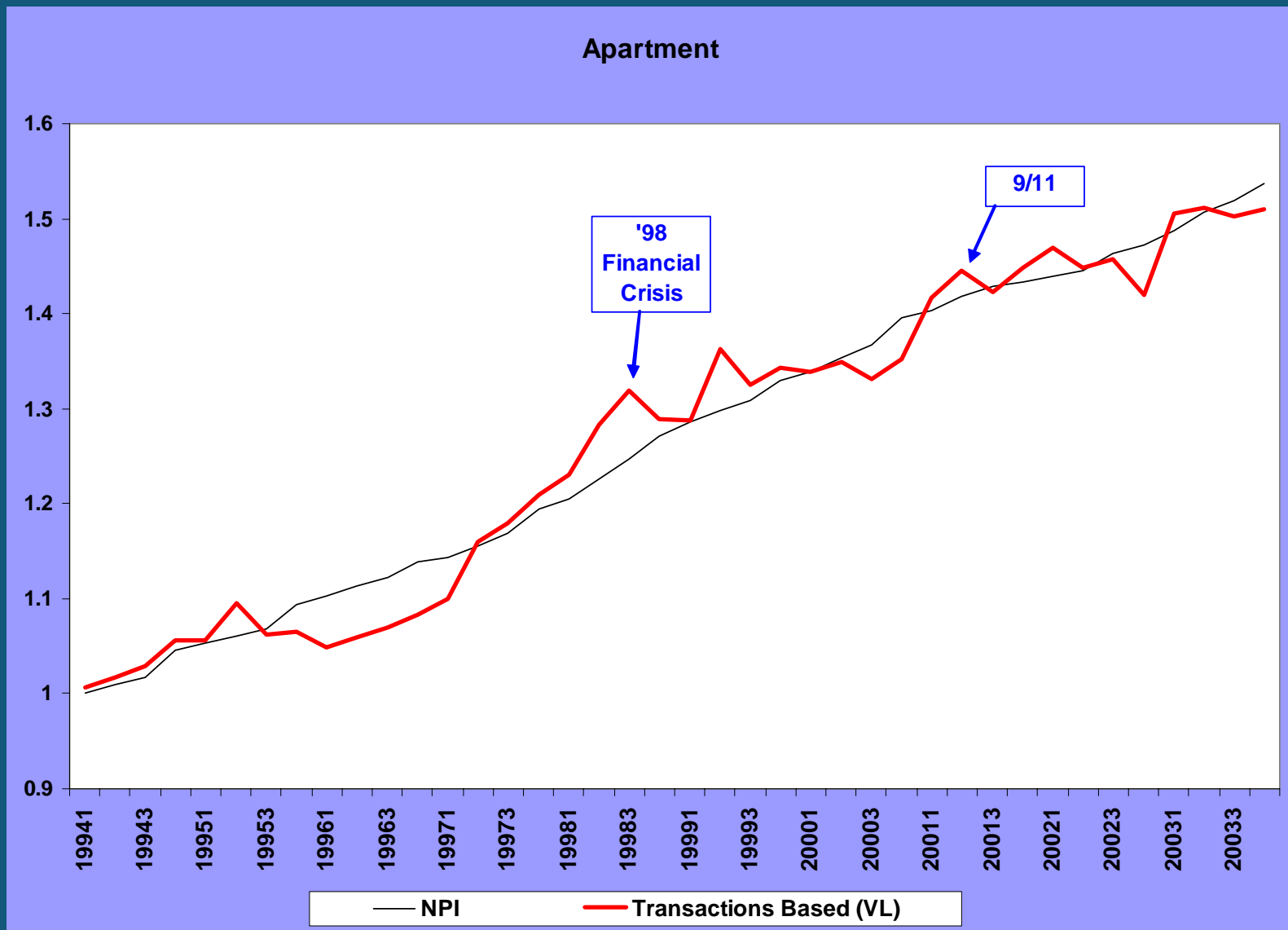
Transactions Based Index

Preliminary Development



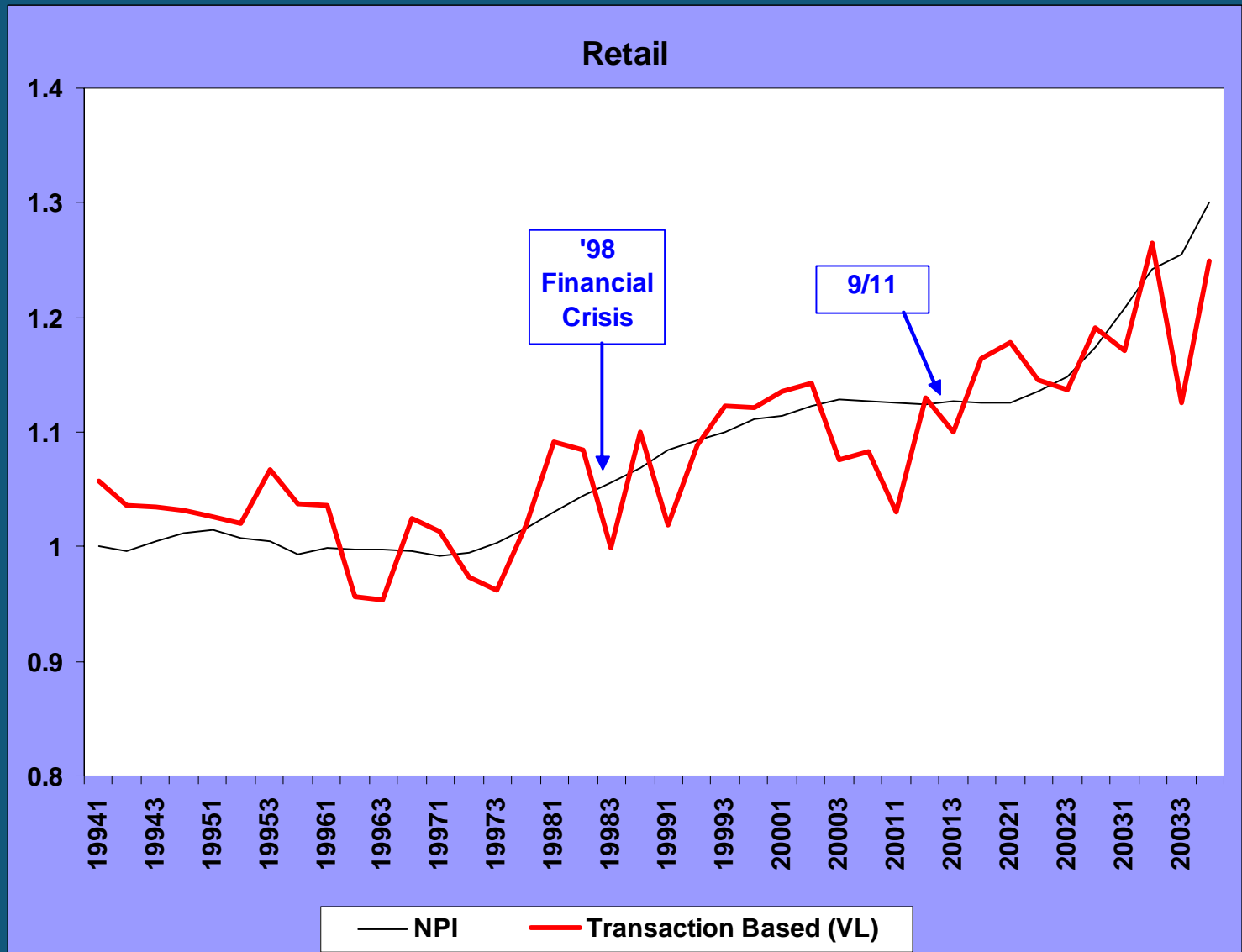
Transactions Based Index

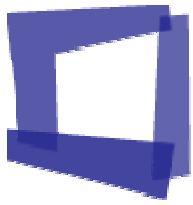
Preliminary Development



Transactions Based Index

Preliminary Development

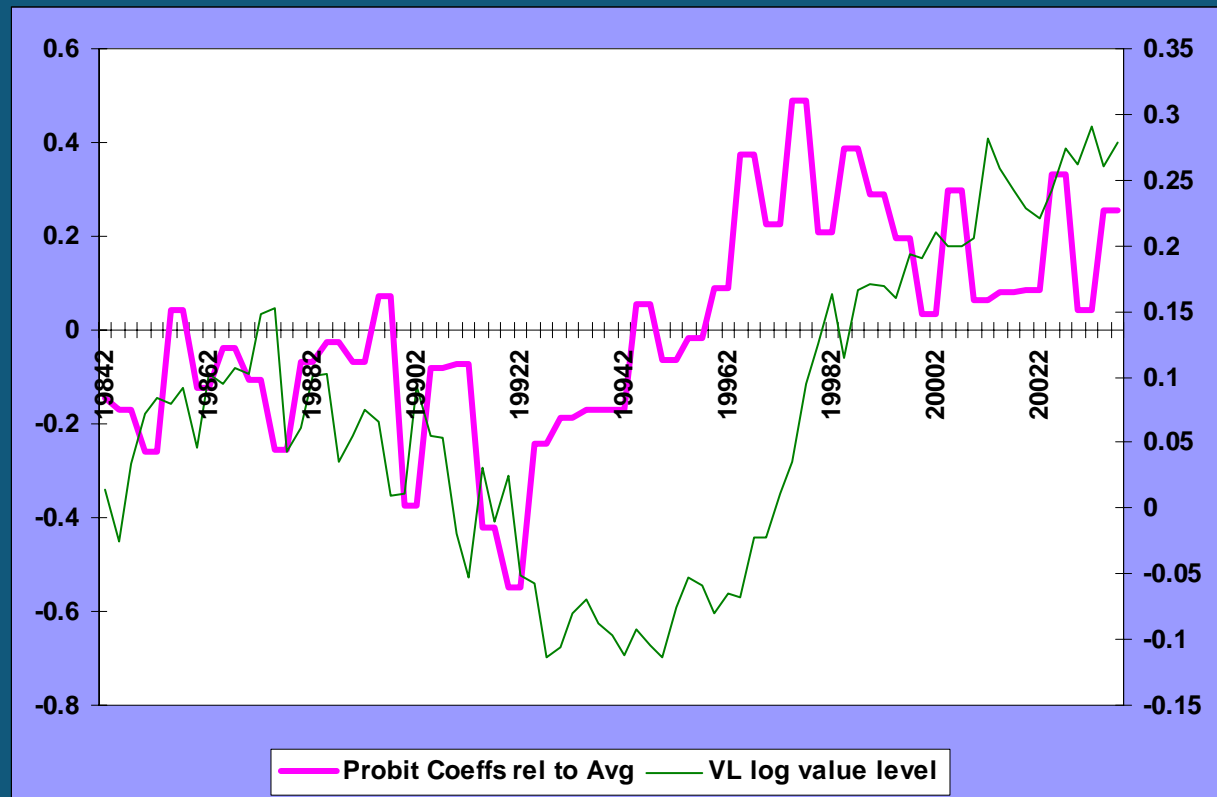


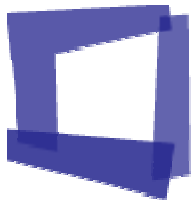


Transactions Based Index

Preliminary Development

FGGH (2003) Model to combine price and trading volume info to identify separate indexes for demand and supply sides of the market . . .

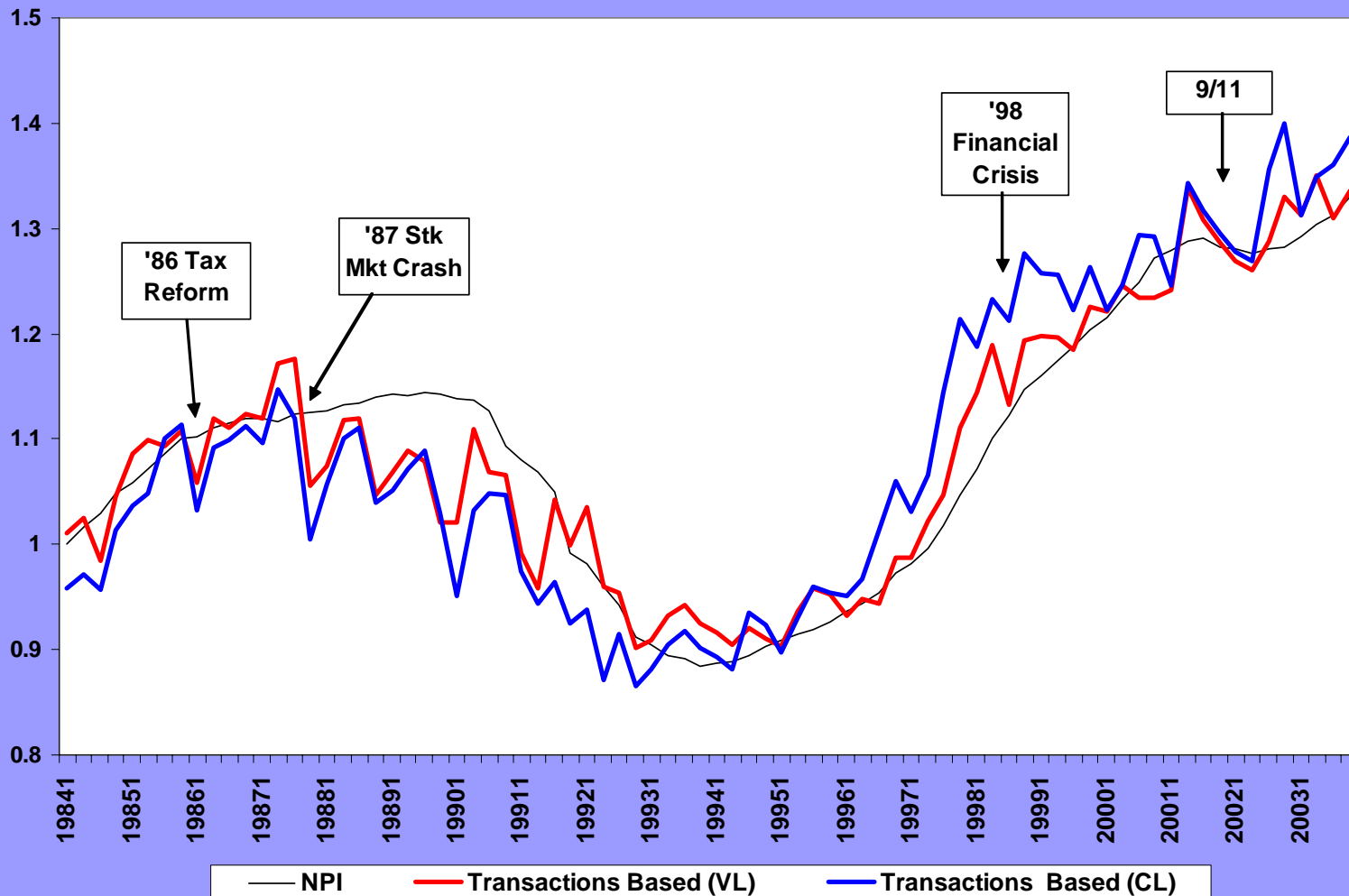


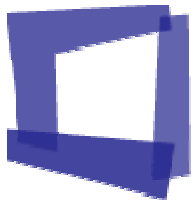


Transactions Based Index

Preliminary Development

Quarterly Appreciation Levels, Variable & Constant Liquidity
All Properties

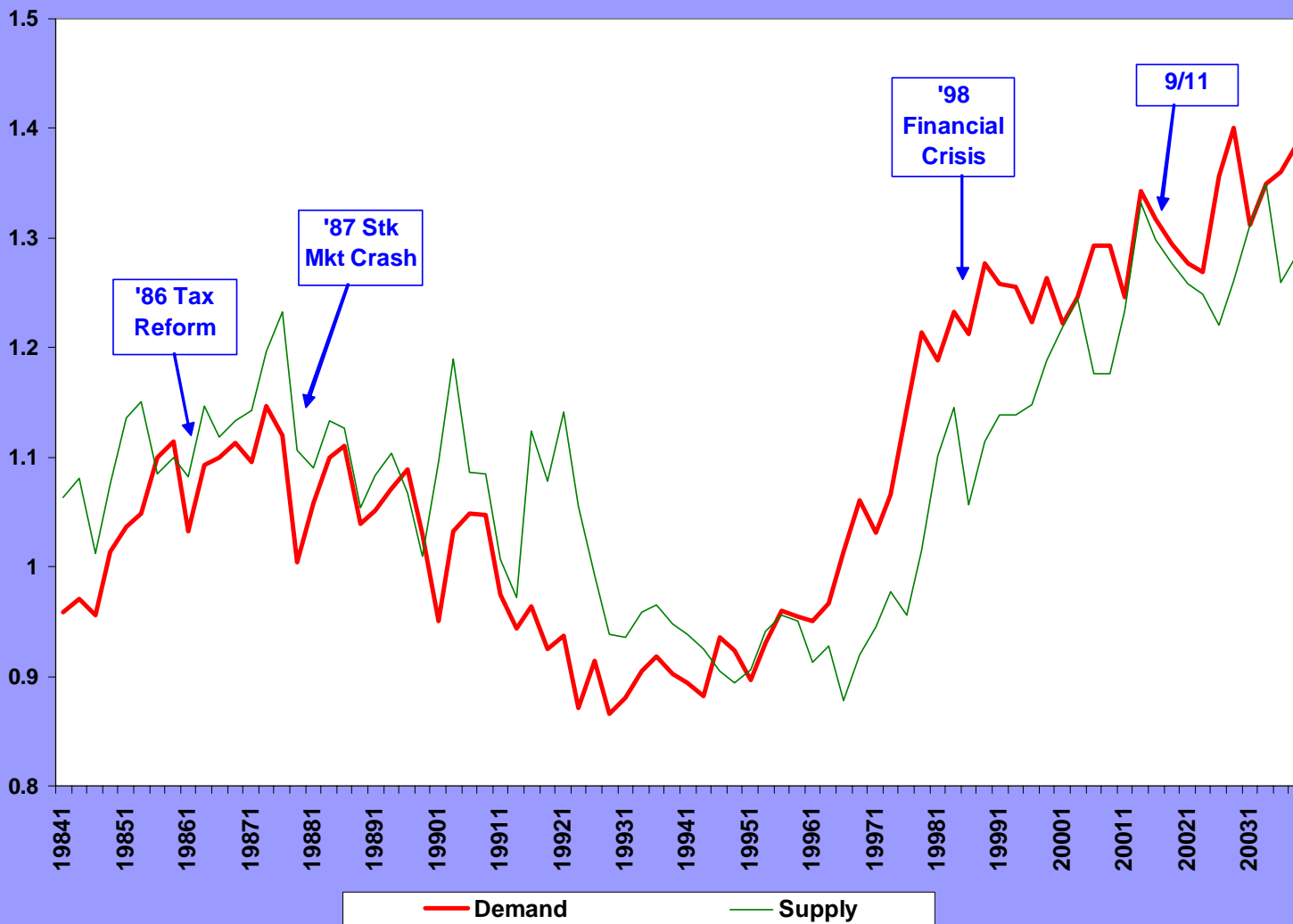


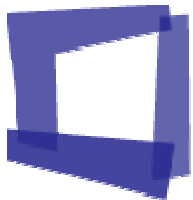


Transactions Based Index

Preliminary Development

Demand Side (Constant Liquidity) and Supply Side Quarterly Price Indexes

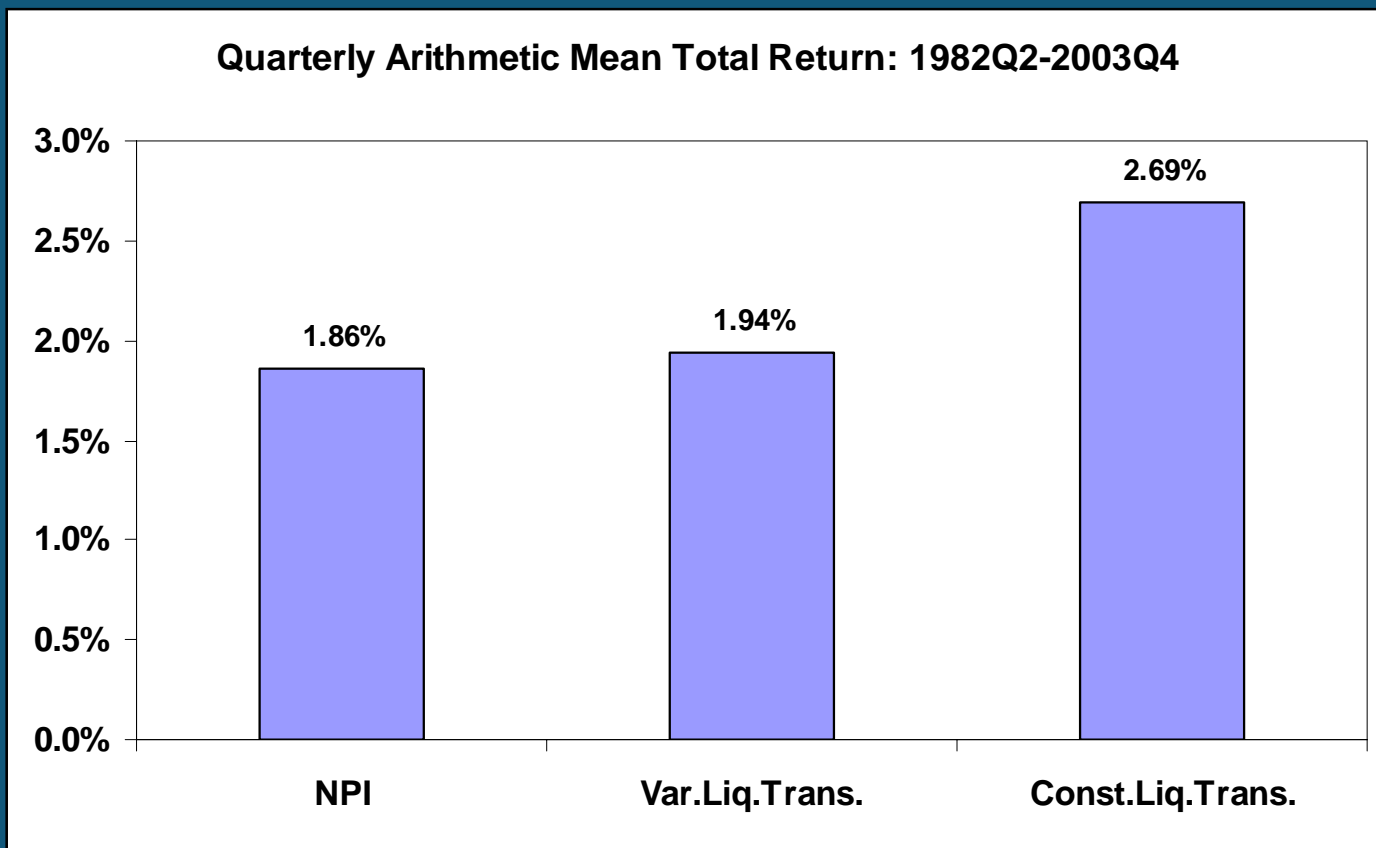




Transactions Based Index

Preliminary Development

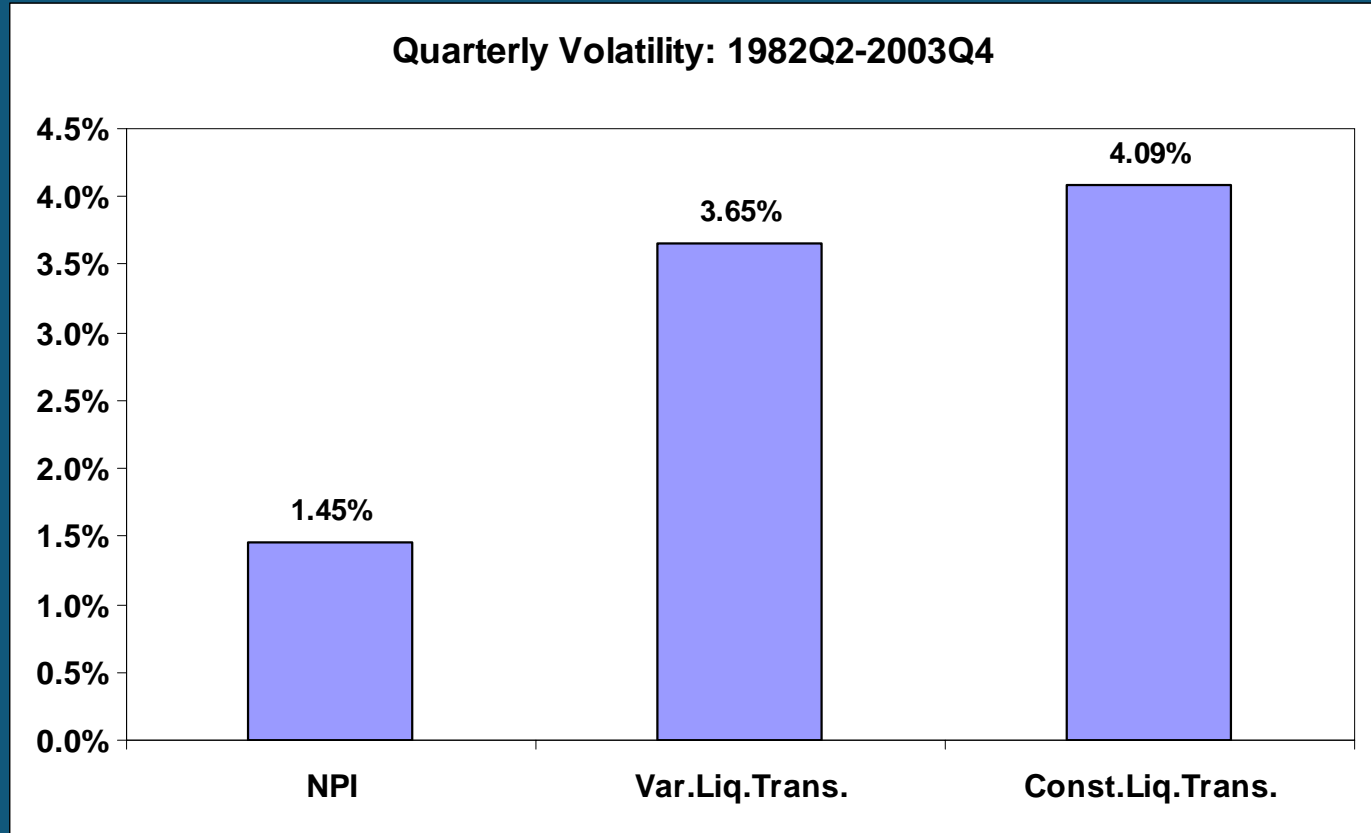
Mean total returns . . .



Transactions Based Index

Preliminary Development

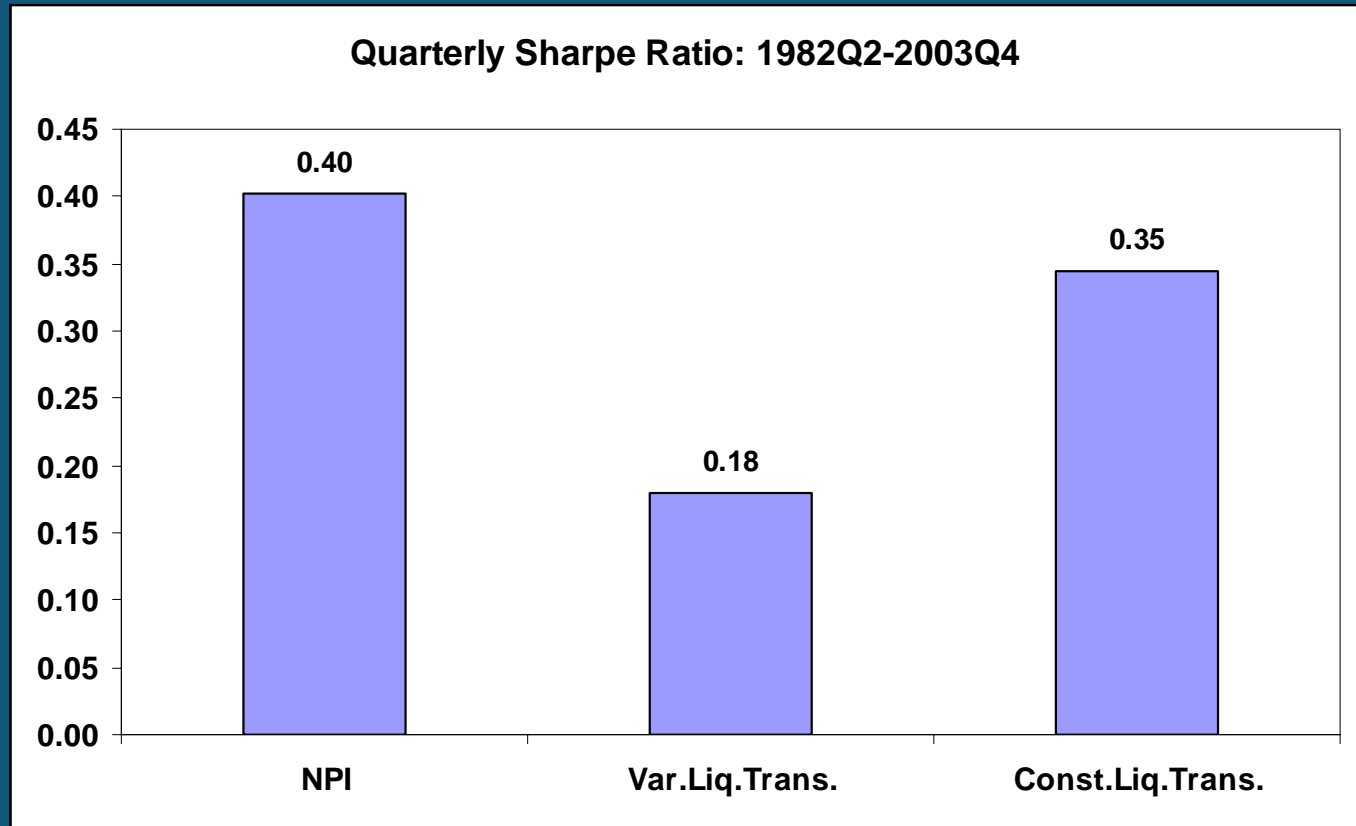
Volatility . . .



Transactions Based Index

Preliminary Development

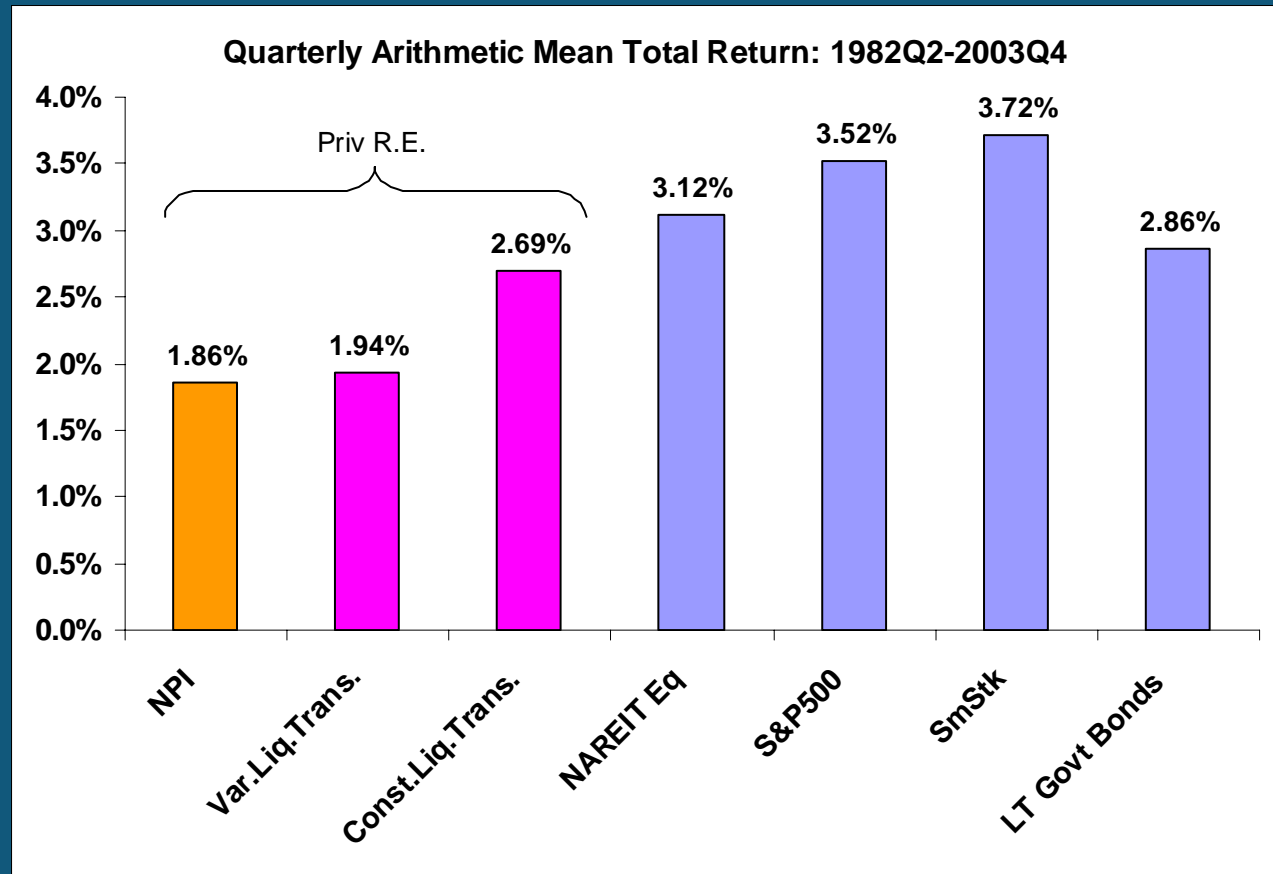
Sharpe Ratio (@ historical T-Bill yld) . . .



Transactions Based Index

Preliminary Development

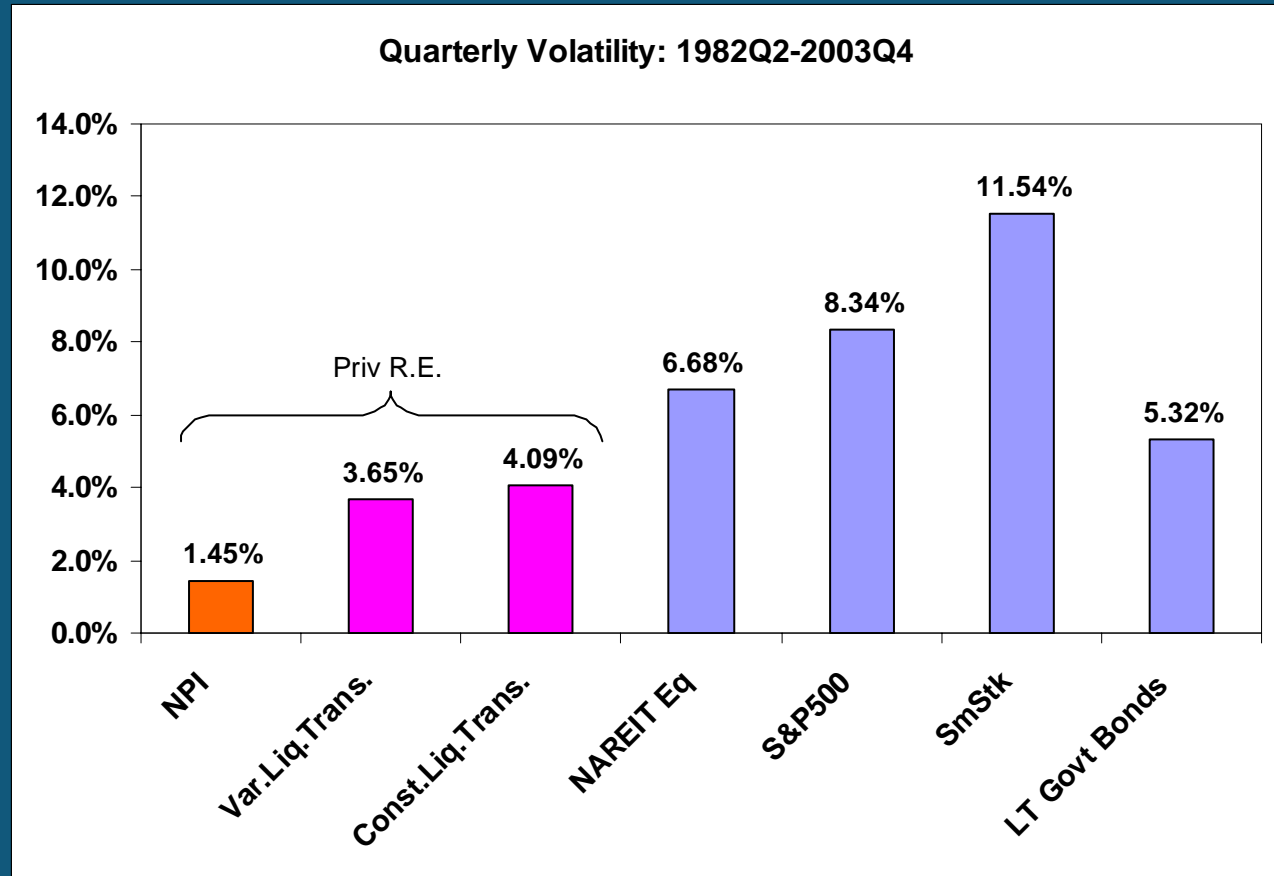
Mean total returns . . .



Transactions Based Index

Preliminary Development

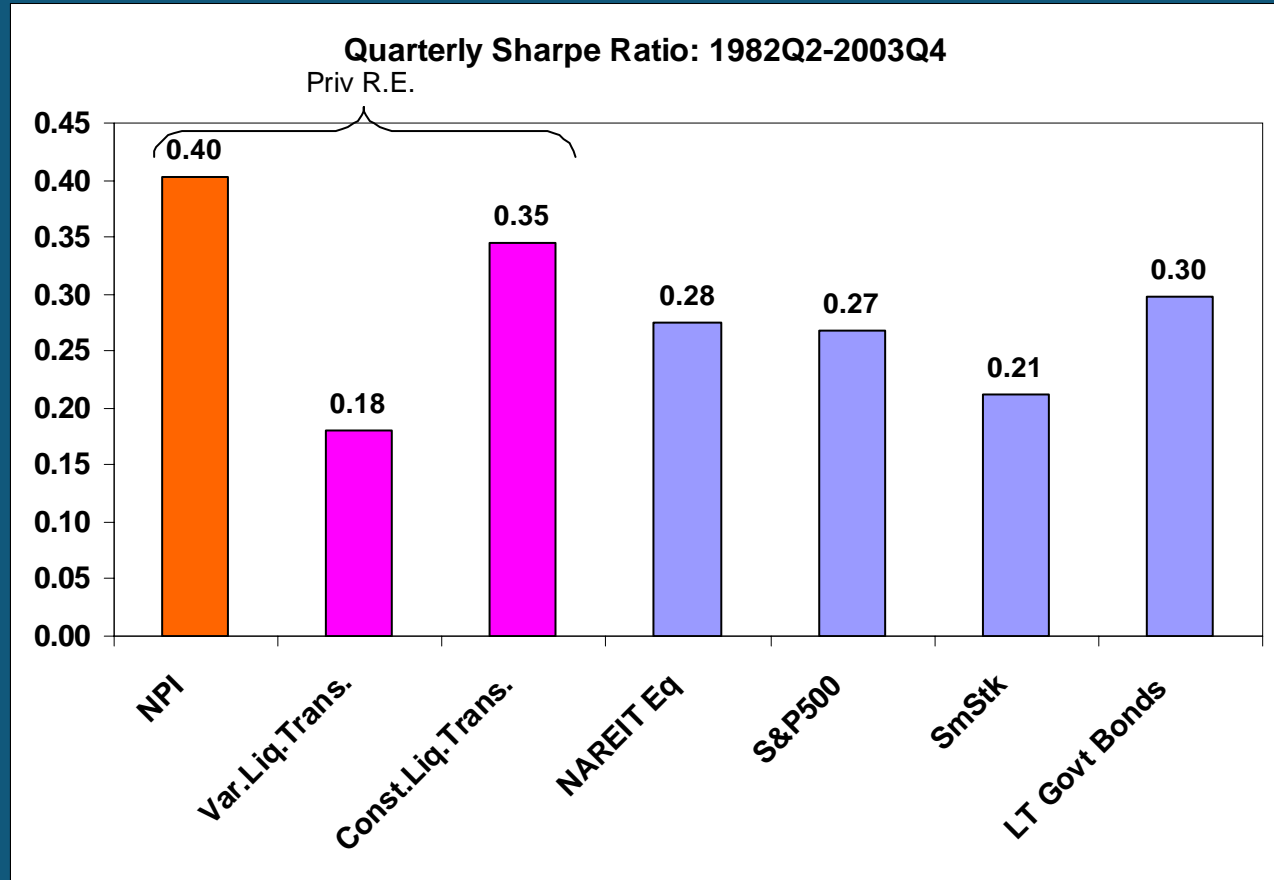
Volatility . . .



Transactions Based Index

Preliminary Development

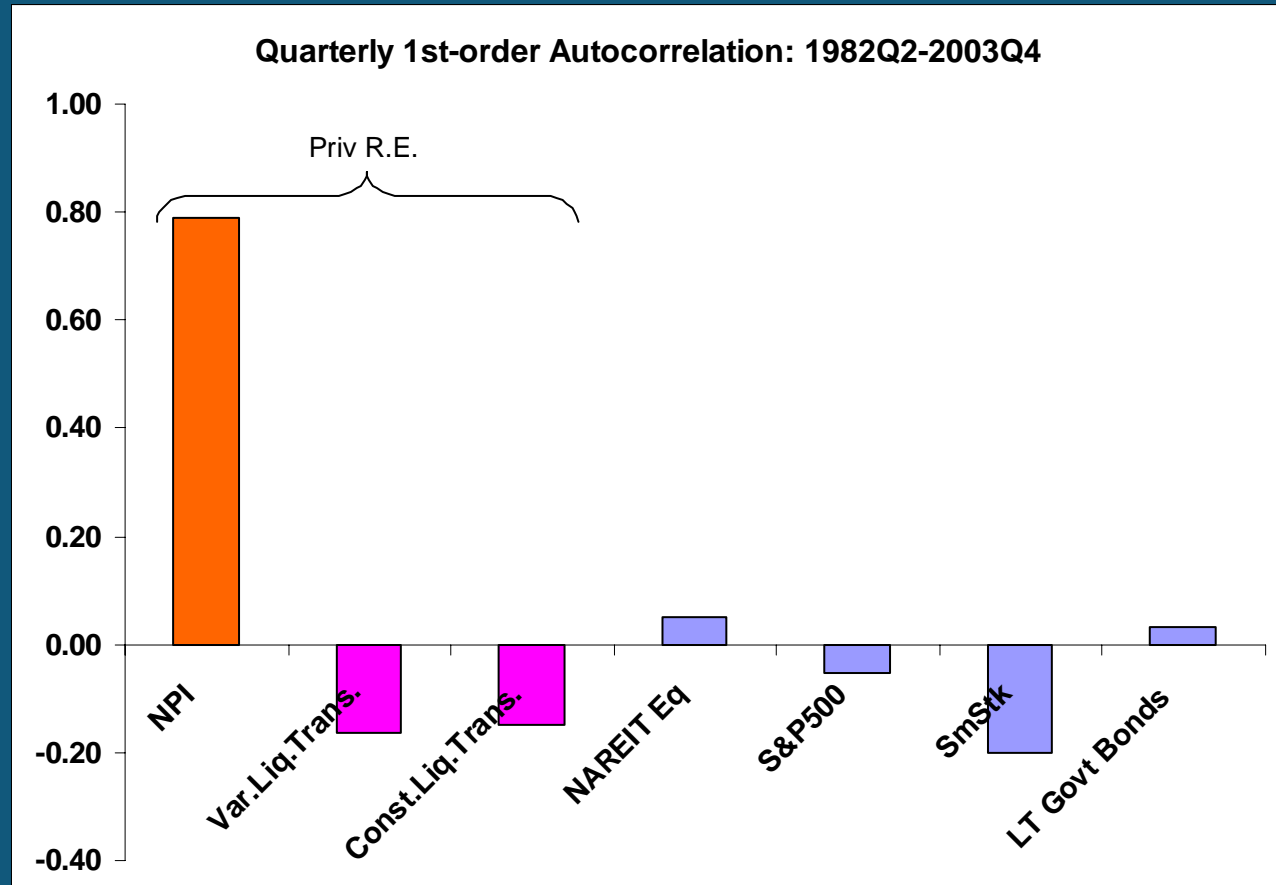
Sharpe Ratio (@ historical T-Bill yld) . . .

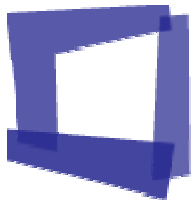


Transactions Based Index

Preliminary Development

1st-order Autocorrelation . . .

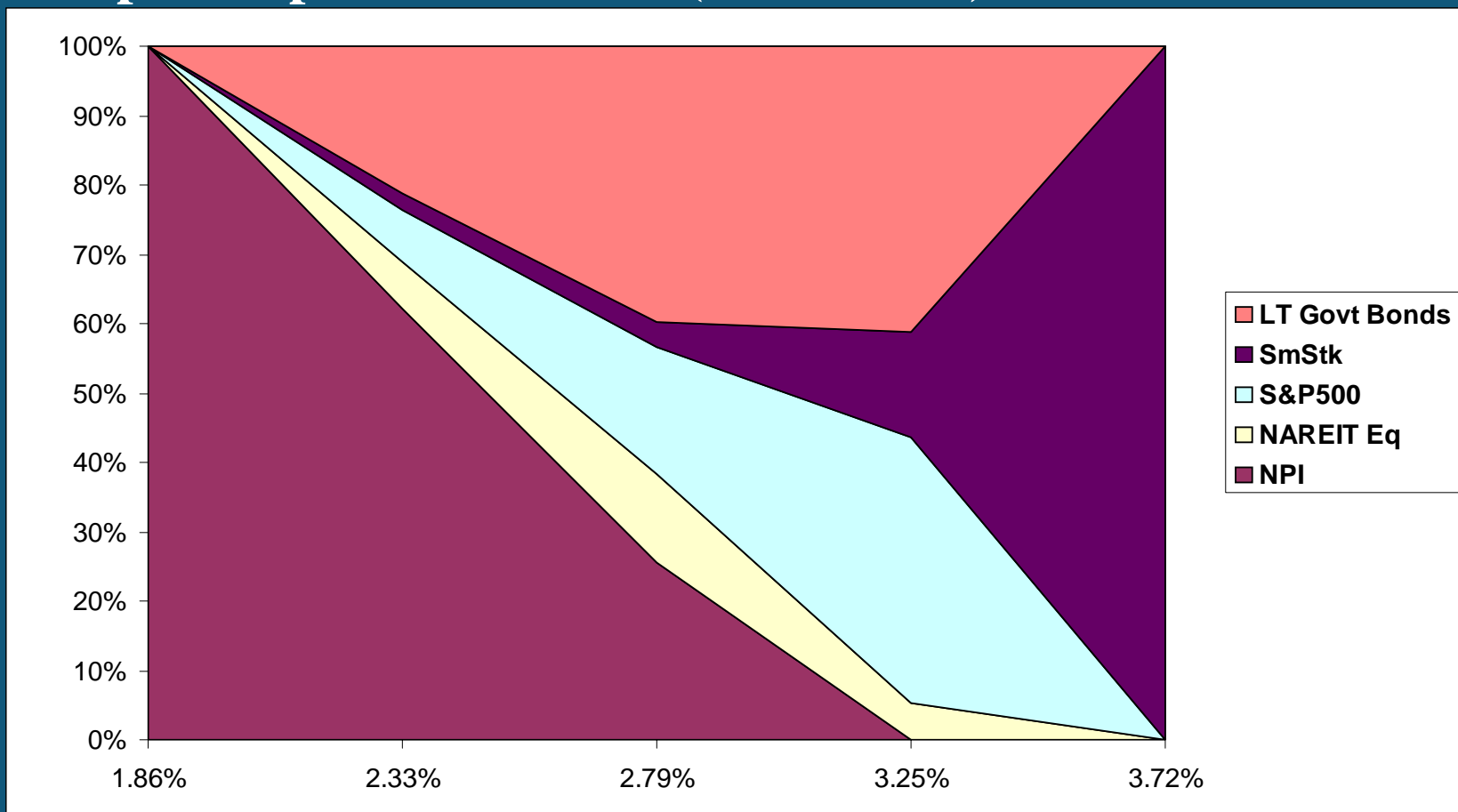




Transactions Based Index

Preliminary Development

Optimal portfolio shares (R.E. = NPI) ...

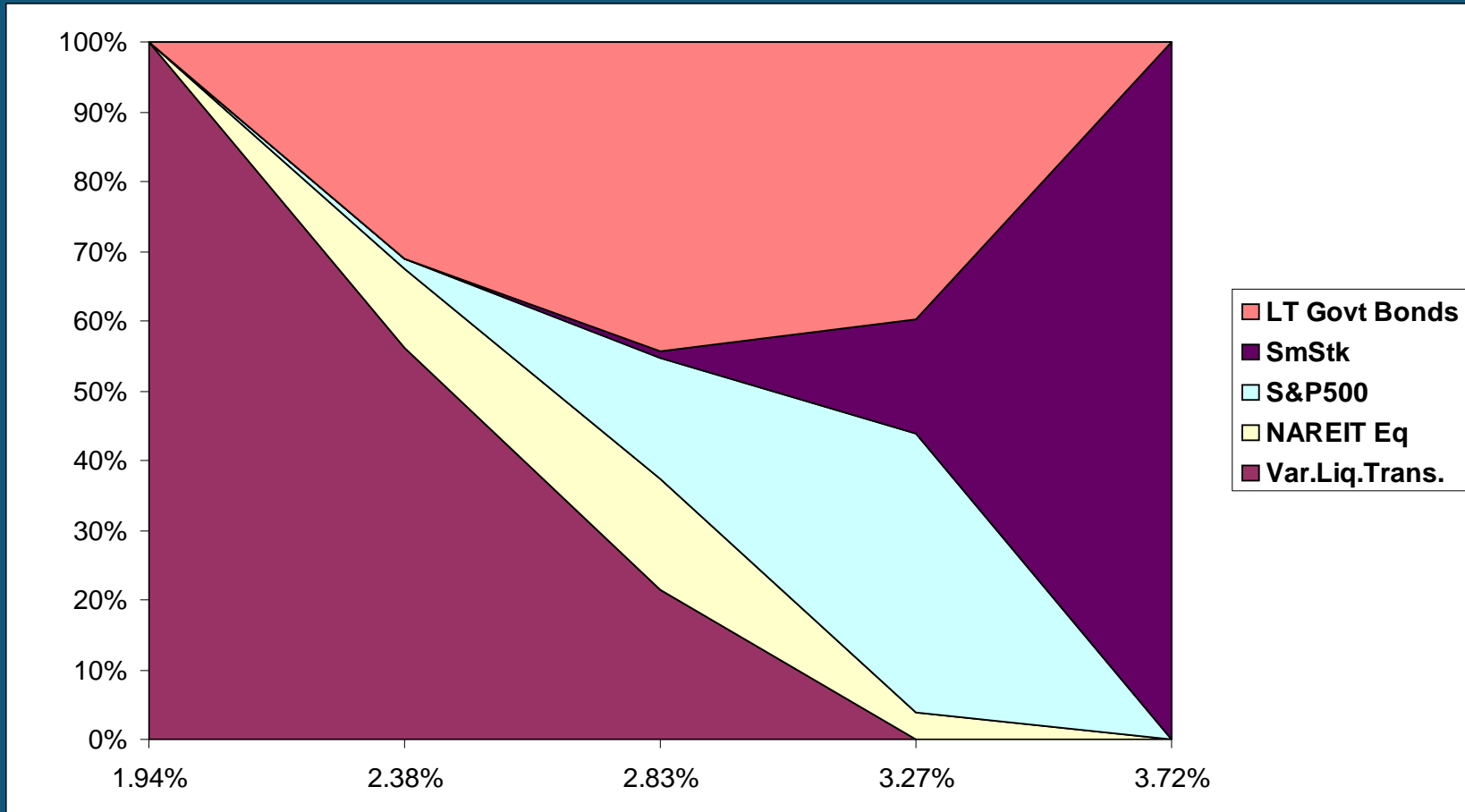


Efficient frontier: Quarterly target returns on horizontal axis.

Transactions Based Index

Preliminary Development

Optimal portfolio shares (R.E. = VL Trans) . . .

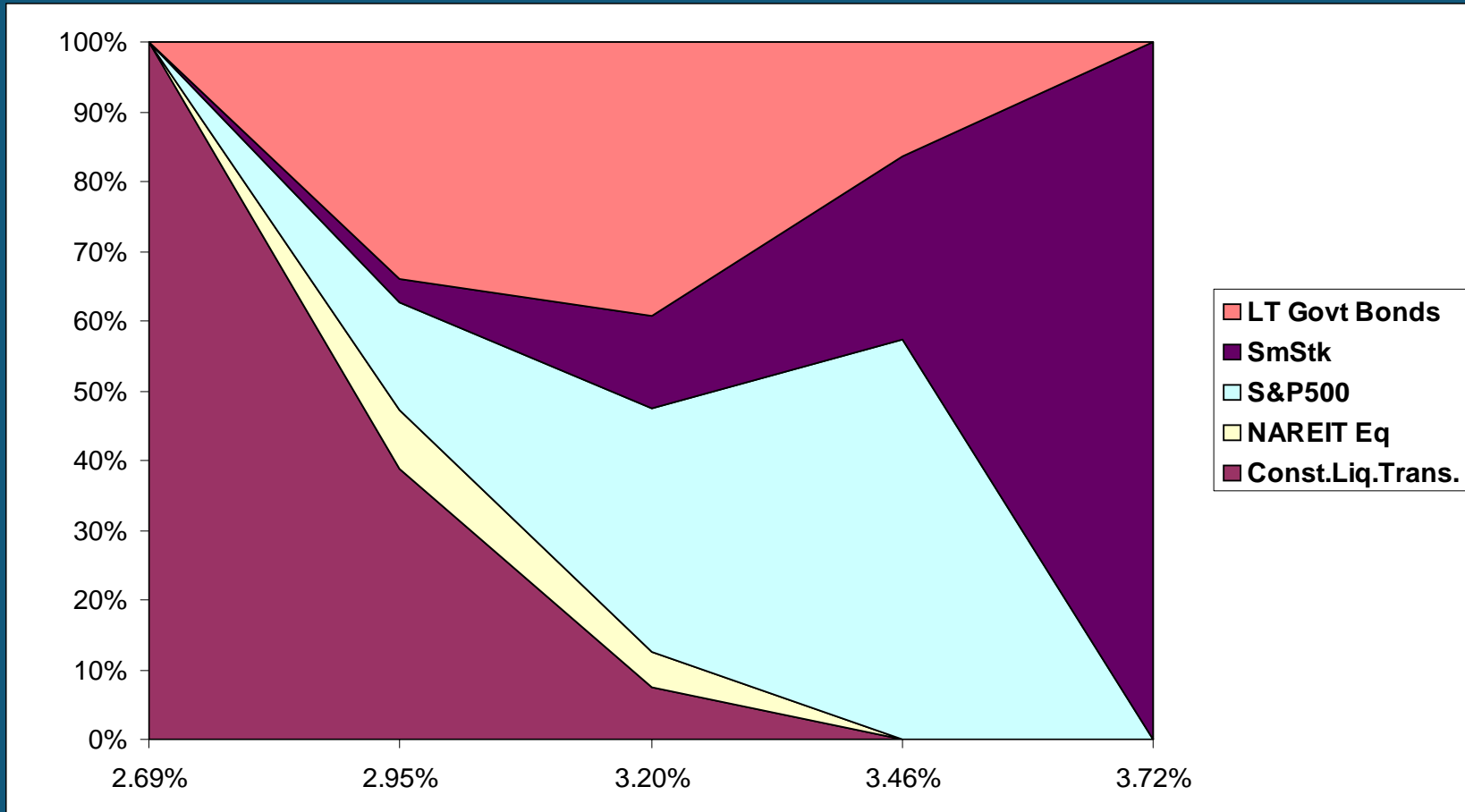


Portf Mgr pre-commits to trade off liq.; not sell in down mkt.

Transactions Based Index

Preliminary Development

Optimal portfolio shares (R.E. = CL Trans) . . .

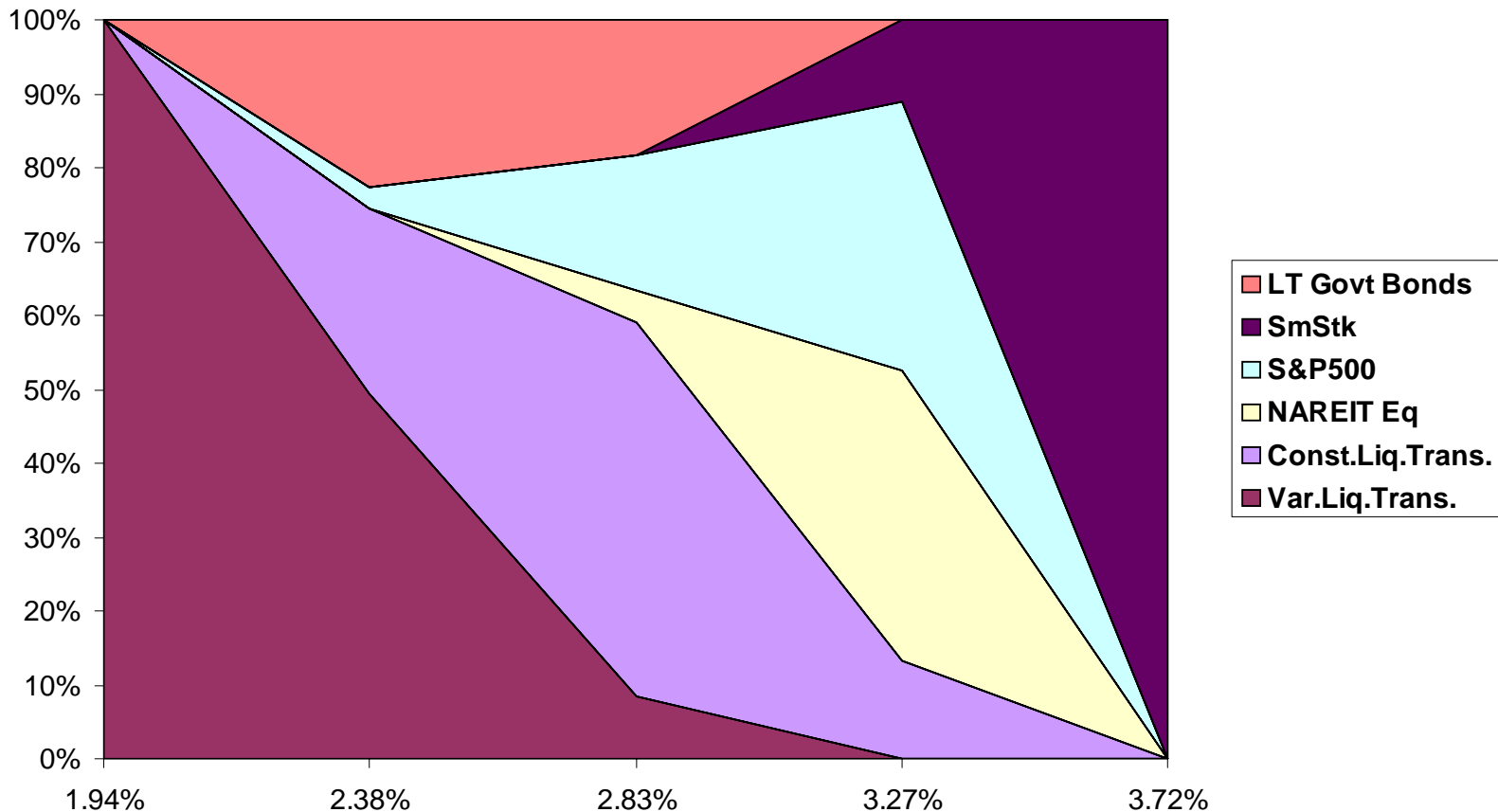


Portf Mgr does not pre-commit to trade off liquidity.

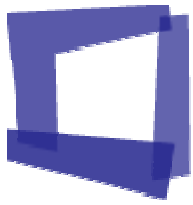
Transactions Based Index

Preliminary Development

Optimal portfolio shares (R.E. = VL &/or CL Trans) . . .



This is plausible if portf mgr adopts “twin” policy for R.E.



Transactions Based Index

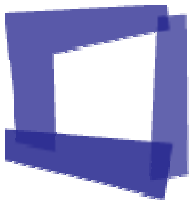
Preliminary Development

Sharpe-Max (“CAPM Mkt”) Portfolios: Four different definitions or policies re private real estate asset class . . .

Sharpe-Maximizing Portfolios:

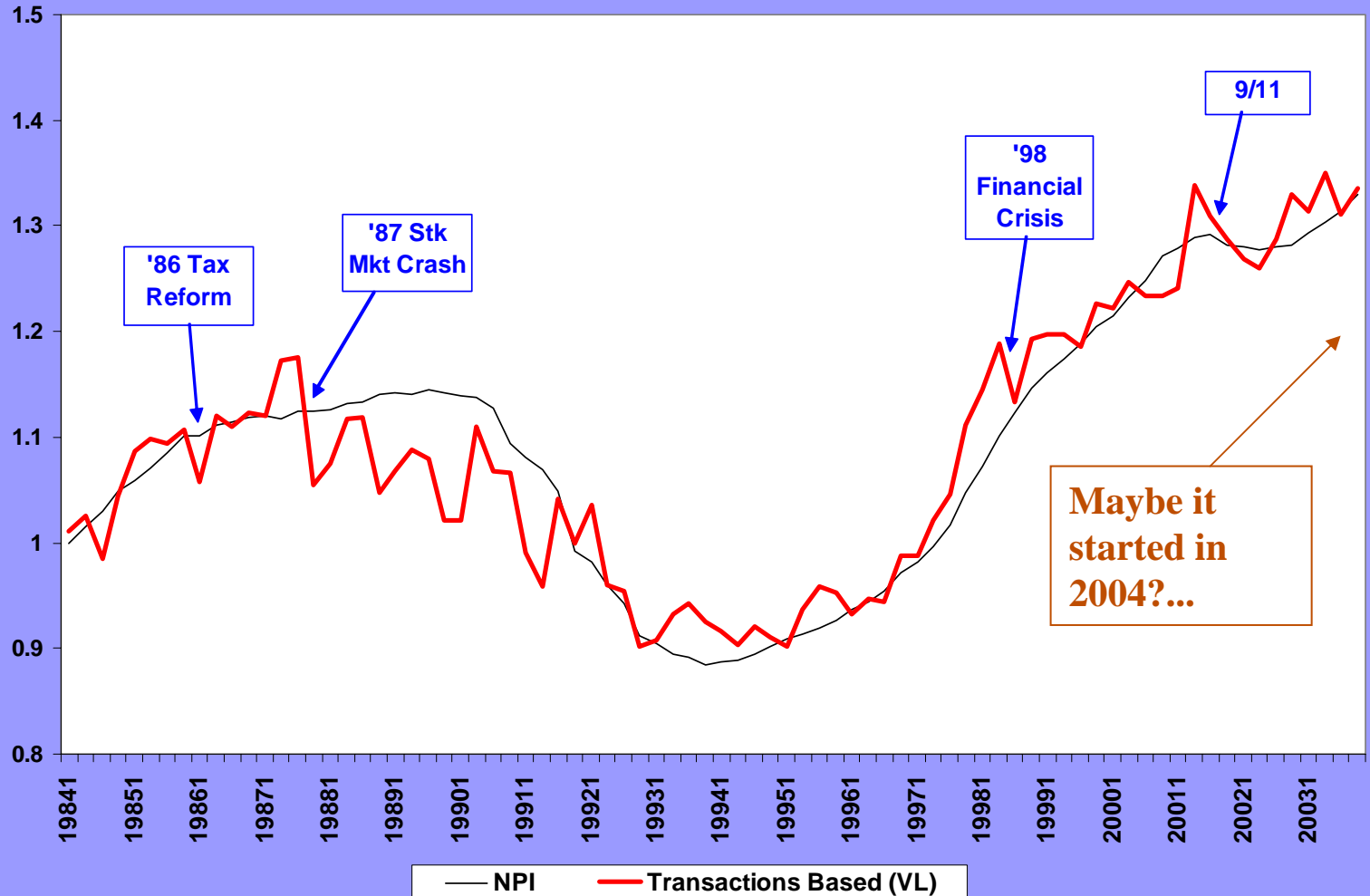
	(1)	(2)	(3)	(4)
NPI	75.26%	NA	NA	NA
Var.Liq.Trans.	NA	28.64%	NA	20.07%
Const.Liq.Trans.	NA	NA	46.80%	46.87%
NAREIT Eq	4.58%	15.40%	9.24%	0.00%
S&P500	3.36%	14.51%	10.48%	14.16%
SmStk	2.15%	0.25%	0.92%	0.00%
LT Govt Bonds	14.64%	41.20%	32.57%	18.90%

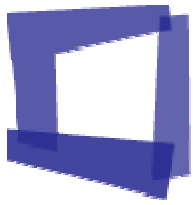
Private Real Estate always is prominent in the optimal portfolio!



Where's the bubble?...

Quarterly Appreciation Levels, Transactions Based vs NPI





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